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ABSTRACT

In 1982, the Maryland State Department of Education initiated a longitudinal study of its Extended Elementary Education Prekindergarten Program. The study was designed to examine the effects of early education on low-income children's later school performance. The school performances of program participants and members of a comparable nonpreschool group were analyzed when participants were 16 years of age. Major questions addressed were: (1) What effect does prekindergarten have on participants' school behavior and how does their school behavior compare with that of members of the nonpreschool group? (2) Does prekindergarten participation improve economically disadvantaged children's performance to the extent that they achieve at a level comparable to that of children from a variety of socioeconomic backgrounds? (3) If prekindergarten leads to higher achievement, are the differential effects sustained over time? and (4) Does the achievement gap between the prekindergarten and nonpreschool groups widen as members of the groups progress through school? In this phase of the study, the effects of prekindergarten were traced from kindergarten through 10th grade. Findings confirm that prekindergarten schooling helps children perform better in the early learning years and that the successful educational experience of these student appears to have a sustained long-term effect that continues through the secondary years. Appended are 24 references. (GLR)

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AN ANALYSIS OF THE LONG-TERM EFFECTS OF THE EEEP PROGRAM: THE SECONDARY YEARS

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ABSTRACT

Follow-up results for the Maryland State Department of Education's longitudinal study of the Extended Elementary Education Prekindergarten Program (EEEP) are summarized in this report. This study examines the on-going school performance of economically disadvantaged program participants and a comparable non-preschool group. Demographic data about students' backgrounds, and previous preschool experiences were collected. The long-term effects of prekindergarten participation were assessed using six outcome measures classified into two categories of school progress and academic achievement. Through the early learning years, the prekindergarten participants were less likely to be classified as at-risk, assigned to special education classes, or retained. The results from the middle learning years, indicate that the prekindergarten group scored significantly better on reading, language arts, and mathematics portions of the California Achievement Test (CAT) package in grades 3, 5, and 8. The differential gap between the two groups widened over time only in the area of mathematics. Throughout their eight years of schooling, the prekindergarten group remained constantly close, but slightly below the average achievement level of the entire population of the state. At the time of 1990-91 follow-up, the study participants were 16 years old. Of the 310 still remaining in the prekindergarten group and the 255 in the non-preschool group, fewer of the prekindergarten participants had been retained in lower grade levels. They also had significantly fewer days absent, than the non-preschool group. Never-the-less, neither groups' participation averaged as few absences as the state averages. Although the drop-out rate for the prekindergarten group was lower than for the non-preschool group, the difference was not significant. Significantly more prekindergarten participants passed the mathematics, writing, and citizenship portions of the Maryland Functional Tests. In the functional reading test, however almost as many of the non-preschool group had passed as in the prekindergarten group. Meanwhile, the gap in mathematics between the two groups continued to widen. This study confirms that prekindergarten schooling experience helps children perform better in the early learning years. The successful educational experiences of these students appears to have a sustained long-term effect that continues through the secondary years.

INTRODUCTION

There is a growing concern over America's political and economic future. According to the Condition of Education, between 1986 and 1988, on the average 4.5% of all 15 to 24 year-olds in grades 10 to 12 dropped out of school each year. Dropout rates for blacks and Hispanics are higher than those for whites. For these students, academic difficulties frequently were evident as early as the third grade (Schorr and Schorr, 1988). The situation becomes more critical when the recent immigration to the U.S. of Hispanics (25-29 years olds) who have little education is taken into account. Those without a high school diploma face an economy and society that is increasingly complex, technological and information-driven (NCES 91-637).

To meet the challenges of the 21st century, on February 25, 1990 President Bush and the National Governor's Association adopted a set of national goals for education. Goal 1 states that by the year 2000, "all children in America will start school ready to learn". On May 22, 1990, the Maryland State Board of Education adopted a set of corresponding goals for public education which will guarantee success for all students. This means that in Maryland by the year 2000, "95% of Maryland's students will start school ready to learn as demonstrated by readiness assessments". Maryland's major strategies for achieving Goal 1 are: pre-kindergarten education, early intervention services, and mandatory kindergarten. With this renewed faith in the power of early childhood education and the national commitment to school readiness, it is more important than ever to know whether preschool can have a long-term effect on student success.

Research on the short-term effects of early intervention for low-income children shows that it improves intellectual functioning and academic performance in the first few years of school (McKey, et al., 1985; Schweinhart and Weikart, 1986). Featherstone (1986), Schweinhart and Weikart (1980), and the Consortium for Longitudinal Studies (1983) all maintain that one of preschool's most significant effects is in helping children meet their schools' expectations and avoid being labeled as failures. Children with early education apparently repeat fewer grades and are placed in special education less often than their non-preschool peers. For example, the New York State Department of Education's evaluation of over 6,000 children who participated in an experimental prekindergarten program revealed that significantly fewer (8%) preschool participants than non-preschool children repeated a grade or spent time in special education. Darlington and Lazar's meta-analysis of number of experimental preschool intervention programs that operated in the early and mid 1960s found similar effects. Across all programs, 44% of the children without preschool education repeated a grade or were assigned to special education; for students who attended preschool, the figure was only 25%.

When findings from the studies involved in Darlington and Lazar's meta-analysis are examined separately, a different picture emerges. Using placement in special education as the outcome measure, only three of six programs demonstrated statistically significant differences between the non-preschool and early intervention groups. Two of the three programs that significantly reduced assignment to special education were home-, not center-based. Using retention as the outcome measure, only one program--the center-based Harlem Training Project--significantly reduced grade level failures.

Only a modest number of studies have been conducted on preschool's mid-term achievement effects; fewer, still, have examined its long-term impact (Schweinhart and Weikart, 1986). Among studies investigating the longer term effects of early education, most report that initial achievement gains wash-out and disappear around third or fourth grade (Gray and Klaus, 1970; Smith and James, 1975; Irvine and Flint, et al., 1982). However, a longitudinal study of preschool education in Cincinnati, Ohio found significant differences in mathematics and reading achievement at eighth grade as measured by the Metropolitan Achievement Test (Nieman and Gastright, 1981). A study of the Perry Preschool Project revealed that, at age 14, the achievement test scores of preschool children were, on the average, 1.2 grade equivalent units higher than those of non-preschoolers. Results from reading, mathematics, and language achievement subtests followed a similar pattern and increased in magnitude of effect from first grade onward.

In 1974, the Educational Research Service, a research organization established and sponsored by the Council of Chief State School Officers and National Association of Elementary School Principals, among other education organizations, reviewed more than 40 studies on the impact of early education. One of its primary conclusions was that the findings are mixed in regard to preschool's effectiveness in raising economically disadvantaged children's performance to middle class norms. More recent findings support that conclusion.

Preliminary results from an assessment of Philadelphia's Prekindergarten Head Start found the program to be effective in raising the educational attainment of low-income children to a level comparable to the district's norms on standardized tests administered through grade three (Philadelphia School District, Office of Research and Evaluation, 1982). Similar effects were noted through grade five for Chicago's Parent-Child Centers, but only for center graduates who were kept in intact classes through the elementary grades (Institute for the Development of Educational Auditing, 1974). Hebbeler, (1985) found that although Head Start improved the performance of low-income children, when their performance was compared to that of higher income students, achievement discrepancies persisted through elementary school and beyond. Early intervention did not improve educationally disadvantaged children's achievement to the extent that they could compete on an equal footing with any peer group.

Findings from research indicate that different preschool programs have different effects on children. High quality programs can have a positive impact on the later school performance of low-income children but they don't always. It is thus naive to believe that the benefits of early education are guaranteed solely by its provision. Many of the preschool programs that resulted in positive educational outcomes were model demonstration projects with human and material resources far beyond those typically available to programs operated on a much wider scale. In addition, many were specifically developed with research purposes in mind. They were rigorously planned, very carefully implemented, and stringently supervised (Darlington, 1983). This may be more than can be expected of more typical field programs that are constrained by the conditions of everyday school practice.

There are few longitudinal evaluations of state-funded prekindergarten programs. The New York State Department of Education reported mixed mid-term effects for its experimental prekindergartens. The South Carolina State Department of Education began following its program participants in 1987. Initial findings indicate that prekindergarten increased children's readiness for first grade, if a level of program quality was maintained. Still fewer studies examined the long term impact.

Given the limited research available on the long-term effects of state-funded prekindergarten education, in 1982, the Maryland State Department of Education (MSDE) initiated a longitudinal study of its Extended Elementary Education Prekindergarten Program (EEEP). This retrospective study examines the on-going school performance of program participants and a comparable non-preschool group. The major questions the study address are:

1. In comparison to a similar group with no known preschool experience, what effect does prekindergarten have on participants' school performance?

2. Does prekindergarten participation improve economically disadvantaged children's performance to the extent that they achieve at a level comparable to that of children from a variety of socioeconomic backgrounds?

3. If prekindergarten leads to higher achievement, are the differential effects sustained over time? Does the achievement gap between the prekindergarten and non-preschool groups widen as they progress through school?

PREKINDERGARTEN PROGRAM BACKGROUND

The Maryland State Department of Education provides limited funds to public school systems to operate prekindergarten as part of the Extended Elementary Education Prekindergarten Program. The impetus for the development of the EEEP program came from former State Superintendent David W. Hornbeck who was concerned about the lack of publicly funded preschool opportunities for Maryland's neediest children. As a result of expressing his concern to the State Board of Education, Resolution No. 1978-17 was passed.

It directed MSDE to develop a program to extend elementary education to four-year-olds with a high potential for school failure. The Resolution also called for coordination in each school system between prekindergarten and existing programs for kindergarten and the early elementary grades.

EEEP encompasses prekindergarten through grade three. Its overall goal is to provide quality experiences that will help children develop and use the basic competencies necessary for success in the middle and later learning years and beyond. Guidelines for the implementation of the prekindergarten program are loosely structured at the state level to allow for local adaptation based on local school system philosophies and the needs of children being served by each school. The state guidelines to which each local school system receiving program funds must conform have remained the same since the program's initial inception. As currently outlined in Standards for Implementing Quality Prekindergarten Education (Maryland State Department of Education, 1987), they include:

Prekindergarten Education

* Two daily sessions that operate a minimum of 2-1/2 hours each
* A ratio of 20 children to two adults, one of whom is a state-certified early childhood education teacher and the other of whom is a full-time assistant
* A curricular focus on all aspects of development
* A balance in learning through small group teacher-facilitated experiences and child-initiated activities. Reliance on an open-framework approach to program implementation.
* Ongoing assessment of each child's growth and development primarily through observation

Continuity of Learning

* Cross-grade staff communication and cooperation to ensure continuity of learning beyond prekindergarten
* Careful attention to initial placement when children move from one grade level to the next
* Careful attention to within-grade pacing to accommodate individual strengths and needs

Home-School Cooperation

* Daily opportunities for parents to participate in the school-based program
* Parental involvement in extending learning outside of school

Program Staff

- Regular and on-going program support and supervision by central office personnel
- Training to increase local school staff's understanding of and skill in implementing appropriate and effective early childhood programs

Accountability

- Annual school and school system evaluations of program appropriateness and program effectiveness in meeting state and/or locally identified goals
- Local school system participation in state-conducted evaluations of program impact

Although EEEP began in 1978, it was not implemented as a unified program until the following year. In September 1979, EEEP prekindergartens operated in 33 schools in eight school systems throughout the state. A teacher coordinator assigned to each school assisted with planning, implementation, and staff training. Today, the state-funded program is being implemented in 163 schools in 23 school systems statewide. State funds pay most teachers' and aides' salaries. Federal and local funds absorb additional personnel costs as well as expenses for transportation, materials, and supplies. The teacher coordinator position is no longer supported by state dollars.

METHOD

Subjects. This retrospective study was initiated in the 1982-83 school year when the second wave of prekindergarten graduates were in second grade. To achieve the research objectives, 17 schools that operated the program during the 1979-80 school year were selected using random proportional sampling methods. These 17 schools represented seven local school systems and were located in rural, suburban, and urban areas throughout the state. Within each school, prekindergarten and kindergarten class rolls of 1979-80 and 1980-81 were used to identify potential study participants. All children on the prekindergarten rolls were assigned to the treatment group if they had a 1975 birth date, no known history of group experiences such as day care or Head Start, and if they had attended kindergarten in the same school as prekindergarten. All children on the kindergarten rolls were assigned to the control group if they had a 1975 birth date, no known history of group experiences, and had not been retained in kindergarten. Using these criteria, an initial group of 577 students were identified as treatment group and 476 were identified as the control group.

In the follow up study that took place in 1983-84, it was decided to limit this study to only those students who had remained by the third grade in the same local school system in which they had begun their schooling. Consequently those students who had transferred out of state, to another local school system within the state or to a non-public school were not included in the follow-up study.

Data collected on students' demographic and background characteristics, as listed in Table 1 below, showed a remarkable similarity between the two groups. In fact, tests of differences between proportions and means of a number of demographic variables resulted in few statistically significant differences. Even when means of some indicators (eg. mothers' education or mothers' occupation) were statistically different, this difference in practical terms (11.7 years of education versus 10.8 years) did not signify a meaningful advantage as the average mother in both groups had not completed high school. In the case of the number of siblings the two numbers 1.63 and 2.07 for all practical purposes amount to a total of two siblings with no meaningful difference even though statistically they may differ.

Occupational data were coded from 1 to 11 with persons not in the work force receiving a rank of 1 and laborers, for example, a rank of 2. Occupations were assigned to categories on the basis of their score on the Index of Occupational Status (Reiss, Occupations and Social Status). This particular scale was used as a reference because it takes both education and income into consideration. It thus provided some information

not otherwise available. While mothers' occupation for the prekindergarten group averaged 3.0 to 2.13 for the non-preschool group these averages did not represent practical differences, while statistically they were significant.

Table 1

Background Characteristics of the EEEP Prekindergarten and Non-Preschool Group at the Time of School Entry

Background Characteristic	Group			
	Prekindergarten N=356	Non-Preschool N=305	F value	p=
Both Parents in the Home	.53	.49	1.07	.30
Proportion Minority	.71	.74	.74	.39
Proportion Male	.47	.51	1.07	.30
Proportion Older **	.70	.65	1.82	.36
Mother's Education (in years)	11.70	10.80	32.98	* .00
Father's Education (in years)	11.90	11.40	2.80	.10
Mother's Occupational Status	3.00	2.13	18.44	* .00
Father's Occupational Status	4.41	4.11	1.19	.28
Number of Siblings	1.63	2.07	14.62	* .00
Number of Persons in Household	4.50	4.57	.29	.59

*** Difference is statistically significant.**
**** Children born between January 1 and August 31, 1975.**

Data Collection. In addition to demographic data which included parents' occupations and educational levels, presence or absence of both parents in the home, number of adults living in the home, and number of siblings, academic data for each child were collected from student records. Information concerning each child's preschool experiences and the number of schools previously attended was also recorded as a part of the academic history.

The effects of prekindergarten participation were assessed using six outcome measures classified into two categories: school progress and academic achievement. The school progress category included four measures related to students' success in meeting the minimum requirements of one grade level and their readiness to move to the next, and their participation in terms of daily school attendance and by not dropping-out. Used as evidence of unsatisfactory progress were risk status in kindergarten as determined by the Maryland System Teacher Observation Instrument (MSTOI), retention, assignment to special education on a full-time basis, and poor daily attendance, and dropping-out of school. Academic achievement was appraised using standardized test scores for the elementary and middle levels, and functional test results for the secondary level.

When the subjects attended elementary and middle schools, the California Achievement Test (CAT) was required as part of the Maryland Accountability Testing Program. Basic skills achievement was compared using the reading comprehension, total language, and total mathematics subtests of the CAT that was administered in the fall of third, fifth, and eighth grades. In 1982, Maryland expanded its Accountability Testing Program to include functional testing when the State Board of Education required all public high school students to achieve basic competencies in the areas of reading, mathematics, writing, citizenship as a requirement for graduation from high school. The functional tests are first administered in the ninth grade, with the exception of the citizenship test which is first taken in the tenth grade in some local school districts. However, all the local school districts included in this study, first administer their citizenship test in the ninth

grade. Students may take or re-take these tests at any grade level 9-12. The Functional Tests assess whether each student attains basic competencies that are closely aligned to the instructional programs. For this study, comparisons of performance on the functional tests are reported as percentage of students in each group passing.

Students who had been retained or placed in special education classes were excluded from the California Achievement Test analyses in order to avoid off-grade level testing problems. Comparing the achievement of retained third graders, who otherwise would have taken a fourth grade achievement test, to that of third graders who were not retained may have resulted in an inaccurate picture of the retained groups' actual achievement.

Comparisons of the two groups' performance on the California Achievement Test are reported using scale scores (S.S) and grade equivalents (G.E.). Scale scores are three-digit numbers ranging from 000 to 999. They are useful in plotting trends and making comparisons across groups. Grade equivalents, like scale scores, also extend across grade levels. They represent the typical performance of the average student in an average school in a particular school year.

In 1990-91, when the study participants were 16, a follow-up study was undertaken. A survey was sent to each local school district which was included in the original study. The survey requested the following data: current grades, days absent, suspensions, expulsions, pregnancies, drop-outs, and GPAs. Data on suspensions, expulsions, and pregnancies could not be provided for a large portion of the study participants, and could not be included in the subsequent analysis. The local school district which provided most of the study's participants did not routinely calculate grade point averages for comparative purposes. Their grade point average was derived from a formula that weighs advanced courses. Although an attempt was made to convert the scores, the local school district felt that it lacked validity. Therefore, student GPA was also excluded as an outcome measure. Consequently, the school progress outcome measure of grade level was updated, and a new student outcome measure, student participation was added.

Since student participation (defined here as school attendance) influences student learning, it was included as the fourth measure of school progress. Student participation will be presented as attendance rates and drop-out rates. For comparison with the statewide data, attendance rates are reported as the percentage of students absent from school less than 5 days, and those who were absent more than 20 days during the 1990-91 school year. The drop-out rate has been reported as the percentage of prekindergarten and non-preschool students who dropped-out by the 1990-91 school year. The state dropout rate is reported as the percentage of students in grades 9 through 12 who withdrew from school before graduating or completing a Maryland approved educational program during the July through June academic year. Therefore, no comparisons can be made with state data, because it represents a yearly state average for all secondary grades.

Data Analysis. Since study participants had not been randomly assigned to the two groups of pre-kindergarten students and non-preschool students, it was important to see how well-matched each group was to each other in terms of their background/demographic indicators. Using a test of difference between proportions and analysis of variance for mean differences, it was observed that the two groups were very similar in these background variables. Table 1 shows that the two groups were very similar in terms of the proportion of students who had both parents at home. The non-preschool group had slightly smaller proportion with both parents at home (49% vs. 53 %) and had a slightly larger proportion of minority members (74% vs. 71%) for the prekindergarten group). Fathers' education for the groups were almost identical (11.4 vs. 11.9) and fathers' occupational status were very similar (4.11 vs. 4.41 on a scale of 1 to 11). Slight differences in the average of mothers' education (10.8 vs. 11.7), though statistically significant, were of little practical importance. The same observation could be made about mothers' occupation (2.13 vs. 3.00 on a scale of 1 to 11) and the number of siblings in the family (1.63 vs. 2.07) or the number of persons in the household.

Based on these observations, the two groups' third grade achievement scores in reading comprehension, language arts and mathematics were compared using the California Achievement Test (CAT) package. A series of univariate analysis of variance tests for each CAT subtest measure showed that the prekindergarten group

was clearly ahead of the non-preschool group in every testing area. These results were incorporated in the fifth grade and eighth grade testing programs. The question of interest was whether prekindergarten group's academic achievement advantages of the third grade would persist or even increase at the fifth and eighth grade levels. An analysis of covariance was performed using the third grade results as the covariate. The analytic concept underlying this approach was to decompose the explained variance in the dependent variable (achievement scores) as functions of the covariate and factor (grouping) effect. Each of the three subtests scores were analyzed and based on the effect of the covariate (third grade results), mean-achievement-scores for the fifth or eighth grade were adjusted. Test of homogeneity of variances indicated that the assumption of the analysis of covariance was not violated.

Maryland Functional Tests were analyzed and reported as percentage passing for each of the tests. Chi-square tests of differences between passing rates of the two groups were used to compare the results of each of the functional tests.

Limitations of the Study. This longitudinal study had three limitations. The first sample-related limitation was differential attrition. By the 1990-91 study, approximately 13.9% of the subjects group were no longer attending school in the system in which they had started. This amounted to 13.0% attrition rate for the pre-kindergarten group and 15.3% for the non-preschool groups.

Among participants in this study who were unavailable for follow-up, the majority had either moved out-of-state or transferred to a non-public school. Limitations imposed by confidentiality laws, geographical location, and differences in student assessment procedures made it impractical to collect data on such children. Omitting them from the study may have slightly biased the results.

Another sample-related limitation was differential enrollment. Since at the initiation of this study, participation in both prekindergarten and kindergarten in Maryland was voluntary, enrolling one's child in school two years earlier than required may have been indicative of some additional educational motivation on the part of the parent. Differential enrollment could have biased the study in favor of finding an effect for the prekindergarten group.

There is little agreement on the effect of IQ on later school achievement. For example, Lazar (1989) finds that IQ scores are not particularly good predictors of the school achievement of educationally disadvantaged children. However, according to Schweinhart and Weikart (1981), intelligence is the key to initial school success. Although the relationship between intelligence and early school performance is much debated, aptitude or ability is usually included as an independent variable in studies of educational effects. In this study, data were not available or could not be obtained on children's entering abilities. Demographic variables, age, and sex of students were used to determine group equivalency instead.

RESULTS: PREKINDERGARTEN'S IMPACT ON LATER SCHOOL PERFORMANCE

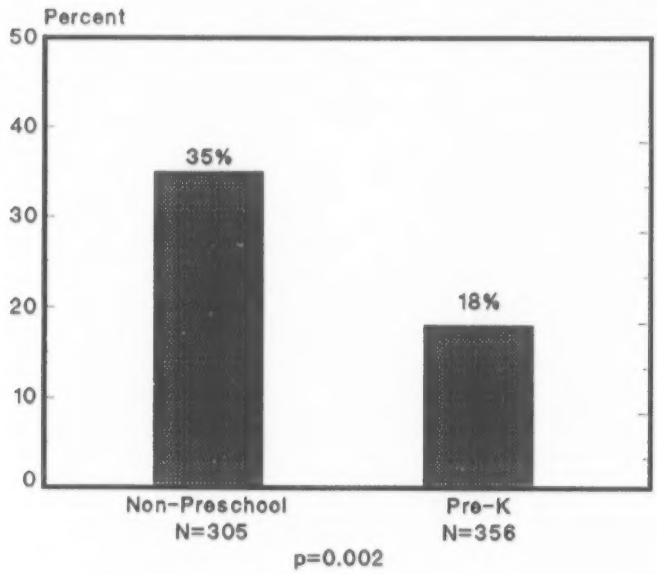
Question 1. In comparison to a similar group with no known preschool experience, what effect does prekindergarten have on participants' school performance through tenth grade?

School Progress: At-Risk Identification in Kindergarten

Each fall, public school kindergarten teachers in Maryland are required to screen their students for potential learning problems. In the fall of 1980, screening occurred through teacher observation using items on the Maryland Systematic Teacher Observation Instrument (MSTOI) as the basis. A cut-off score was applied to MSTOI results to identify children who may be at-risk for first grade learning difficulties. At-risk children received further assessment and, if necessary, interventions to ameliorate their problems. As shown, in Figure 1, results of the MSTOI administration to both groups identified a significantly larger percentage of at-risk students among the non-preschool group than the prekindergarten group.

Figure 1

Percentage of Prekindergarten Students and Non-Preschool Students Identified as Being At-Risk in Kindergarten Fall 1980

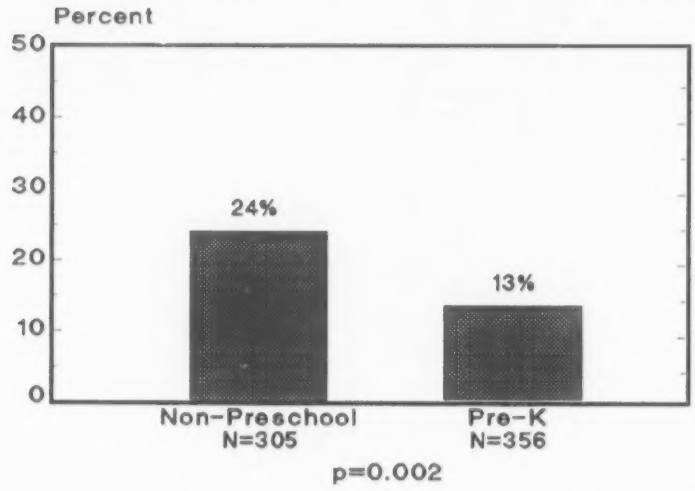


School Progress: Special Education Placements

Special education statistics only include those who were placed in the program on a full time basis. The findings indicate that through fifth grade, only 13% of prekindergarten students were identified as being handicapped and placed in special education. This compared to almost twice as many students (24%) who were identified as special education students in the non-preschool group.

Figure 2

Percentage of Prekindergarten Students and Non-Preschool Students Assigned to Special Education Through Fifth Grade

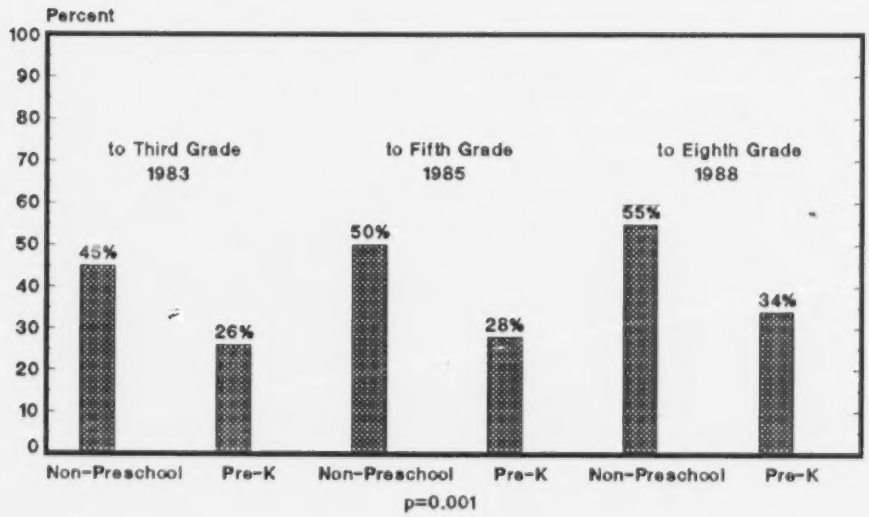


School Progress: Retention

The third measure of school progress used to evaluate prekindergarten program impact was the percentage of children in each group who had been retained in grade at least once during their school careers. The retention findings include children who were placed in special education subsequent to failing grade or grades. Figure 3 shows that through the middle learning years prekindergarten students had a significantly smaller percentage of retention. At third, fifth, and eighth grades, there was an average 20% difference in cumulative retention rates between the prekindergarten and non-preschool groups. For both the prekindergarten and non-preschool groups the highest rate of retention occurred prior to third grade. In no instances could differences in the percentages of grade level retentions be attributed to the effects of age or gender.

Figure 3

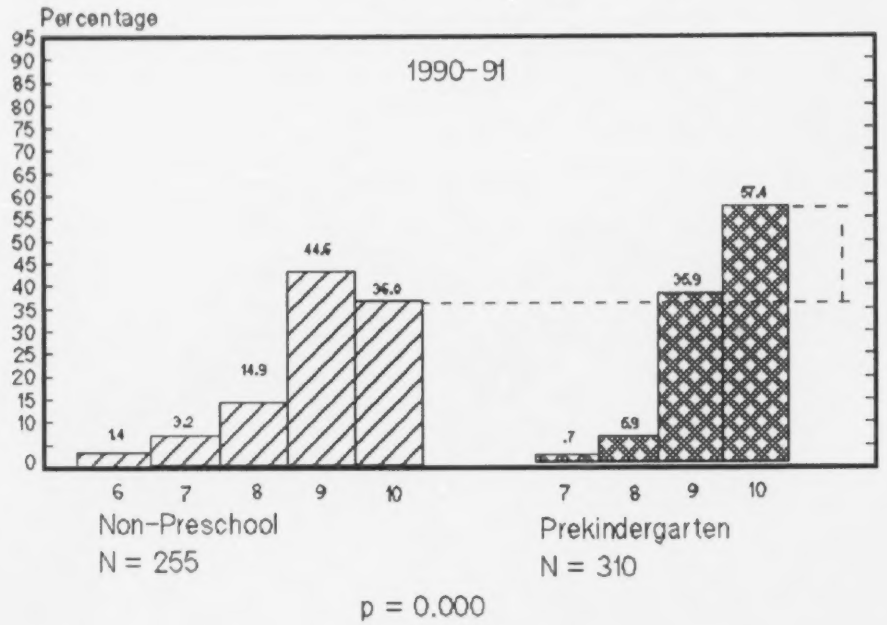
Cumulative Retention Rates for Prekindergarten Graduates and Non-Preschool Students at Third, Fifth, and Eighth Grades



During the 1990-91 study, significantly fewer of the prekindergarten group than the non-preschool group had been retained (43.5% vs. 64.1%). Figure 4 shows that eleven years after entering kindergarten, close to three out of five prekindergarten group members were performing at tenth grade level, compared to slightly more than one-third of the non-preschool students who were performing at the same tenth grade level. Thus, the percentage of the prekindergarten group's in grade 10, exceeded the non-preschool group's percentage in the same grade by as much as 21.4 percent.

FIGURE 4

DISTRIBUTION OF PERCENTAGES OF PREKINDERGARTEN AND NON-PRESCHOOL STUDENTS IN THEIR PRESENT GRADE LEVEL



School Progress: Student Participation

Attendance Rate

The prekindergarten group had significantly fewer absences, than the non-preschool group (Table 2). More prekindergarten students were absent less than five days, than the non-preschool group (20.1% vs. 12.9%). Additionally, slightly more than one-third of the prekindergarten students were absent for more than 20 days, as compared to over one-half of the non-preschool students who fell into this category. Never-the-less, neither groups' participation were fully in par with the state's averages in respective categories (MD School Performance Program Report, 1991).

Table 2

Comparison of Rates of Absence for Prekindergarten and Non-Preschool Students with Statewide Results

1990-91

Days Absent	RATES		
	Prekindergarten	State	Non-Preschool
Less than 5 days	20.1	27.3	12.9
More than 20 days	35.4	16.8	53.7

Group differences are significant at alpha = .05
Chi-square = .0042

Dropout Rate

Table 3 shows that while the drop-out rate for the prekindergarten group was lower than the rate for non-preschool students (8.2% vs. 11.3%), these differences were not significant. However, it should be noted that the drop-out rates pertains to only one academic year 1990-91. Over the remaining period of schooling, this difference for the two groups may indeed become significant.

Table 3

Student Dropout Rates for Prekindergarten and Non-Preschool Students

1990-91

DROP-OUT RATES	
Prekindergarten	Non-Preschool
8.2	11.3

Group differences are not significant at alpha = .05
Chi-square = .2374

Academic Achievement: California Achievement Test Results

Tables 4-6 summarize the two groups' mean scale scores on the measures of academic achievement. In many cases, test score means are not based on the total number of third, fifth and eighth graders in each group, presumably because of their absence from school during the testing period. The data reveals differential achievement favoring the prekindergarten group in all cases. Students in the prekindergarten group scored significantly higher than the non-preschool group on the reading comprehension, total language, and total mathematics subtests of the California Achievement Test at third, fifth and eighth grades.

However, Charts 1, 2 and 3 point out an important finding. Each chart compares the two groups' scaler achievement gains in one of the CAT subtests at the fifth and eighth grade levels. Chart 1 for example, shows that students in either subgroup (prekindergarten or non-preschool) gained approximately 90 points as they progressed from the third to fifth grade. Each subgroup also gained approximately 170 points from the third grade to the eighth grade. Thus, there was no difference between the two groups in the number of points gained in reading comprehension. Chart 2, likewise, shows a gain of approximately 95 points at the fifth grade level and 150 points at the eighth grade level in language arts. Mathematics, however, indicated a different pattern of gain. As shown in Chart 3 the two subgroup average gains were very close with a slight advantage for the prekindergarten group (94.7 vs 91.8), but they become significantly higher at the eighth grade level (200.4 vs 188.4). These observations indicate that while a differential gain in reading and language arts for the prekindergarten group is sustained through the middle learning years, this advantage does not increase as they go through the fifth and eighth grade. Mathematics advantage, however, is cumulative, in that the early gains by the prekindergarten group results in greater gain as these students go through middle school and beyond.

California Achievement Tests:
Mean Scale Scores and Standard Deviations
for the Prekindergarten and Non-Preschool Groups

Table 4: Third Grade Results
Fall 1983

Group	Subtest Area								
	Reading Comprehension			Total Language			Total Mathematics		
	N	X	SD	N	X	SD	N	X	SD
Prekindergarten	260	397.92	50.47	256	428.68	56.51	260	369.64	35.23
Non-Preschool	163	380.08	45.78	164	404.08	51.51	163	355.52	28.42
	F=14.06 p<0.05			F=21.16 p<0.05			F=20.52 p<0.05		

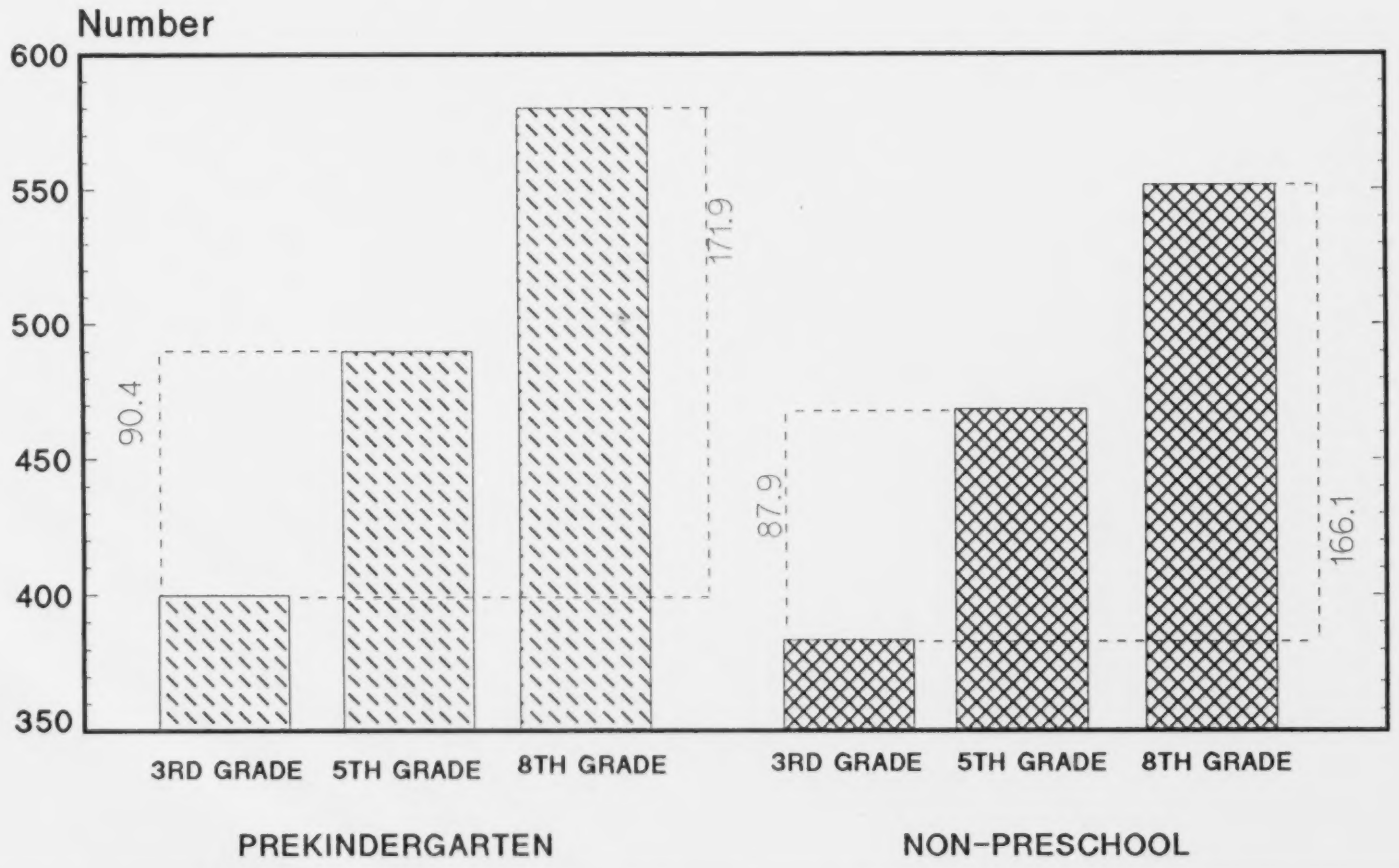
Table 5: Fifth Grade Results
Fall 1985

Group	Subtest Area								
	Reading Comprehension			Total Language			Total Mathematics		
	N	X	SD	N	X	SD	N	X	SD
Prekindergarten	214	488.28	52.89	213	520.23	52.37	214	464.35	39.97
Non-Preschool	119	468.01	51.10	119	500.61	53.88	118	447.30	37.22
	F=11.70 p<0.05			F=10.30 p<0.05			F=15.13 p<0.05		

Table 6: Eighth Grade Results
Fall 1988

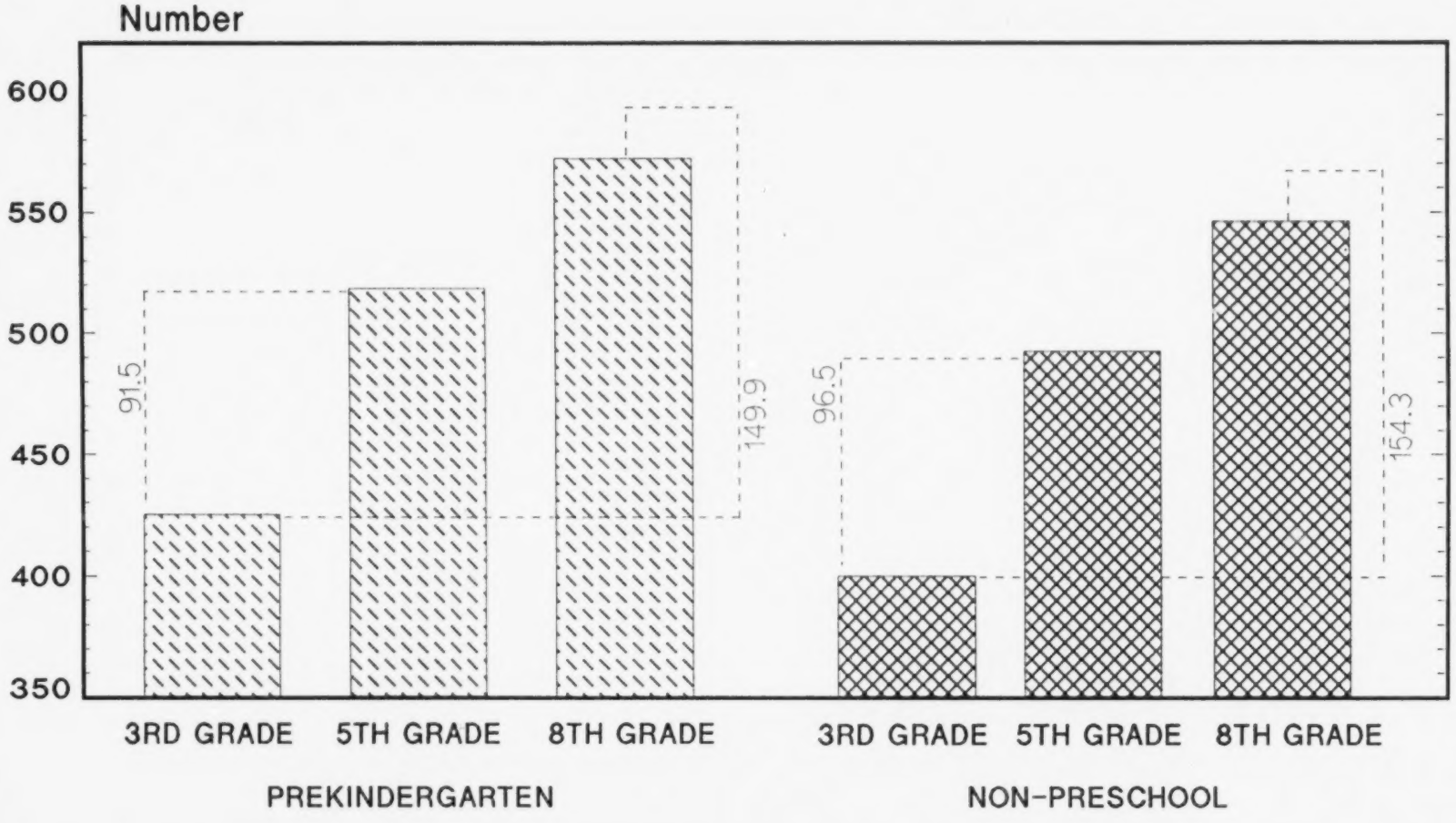
Group	Subtest Area								
	Reading Comprehension			Total Language			Total Mathematics		
	N	X	SD	N	X	SD	N	X	SD
Prekindergarten	198	568.89	68.85	198	578.57	57.57	197	570.03	52.42
Non-Preschool	115	546.18	66.43	114	558.33	59.44	115	543.96	53.43
	F=8.29 p<0.05			F=8.59 p<0.05			F=17.56 p<0.05		

MEAN READING COMPREHENSION ACHIEVEMENT * FOR PREKINDERGARTEN AND NON-PRESCHOOL



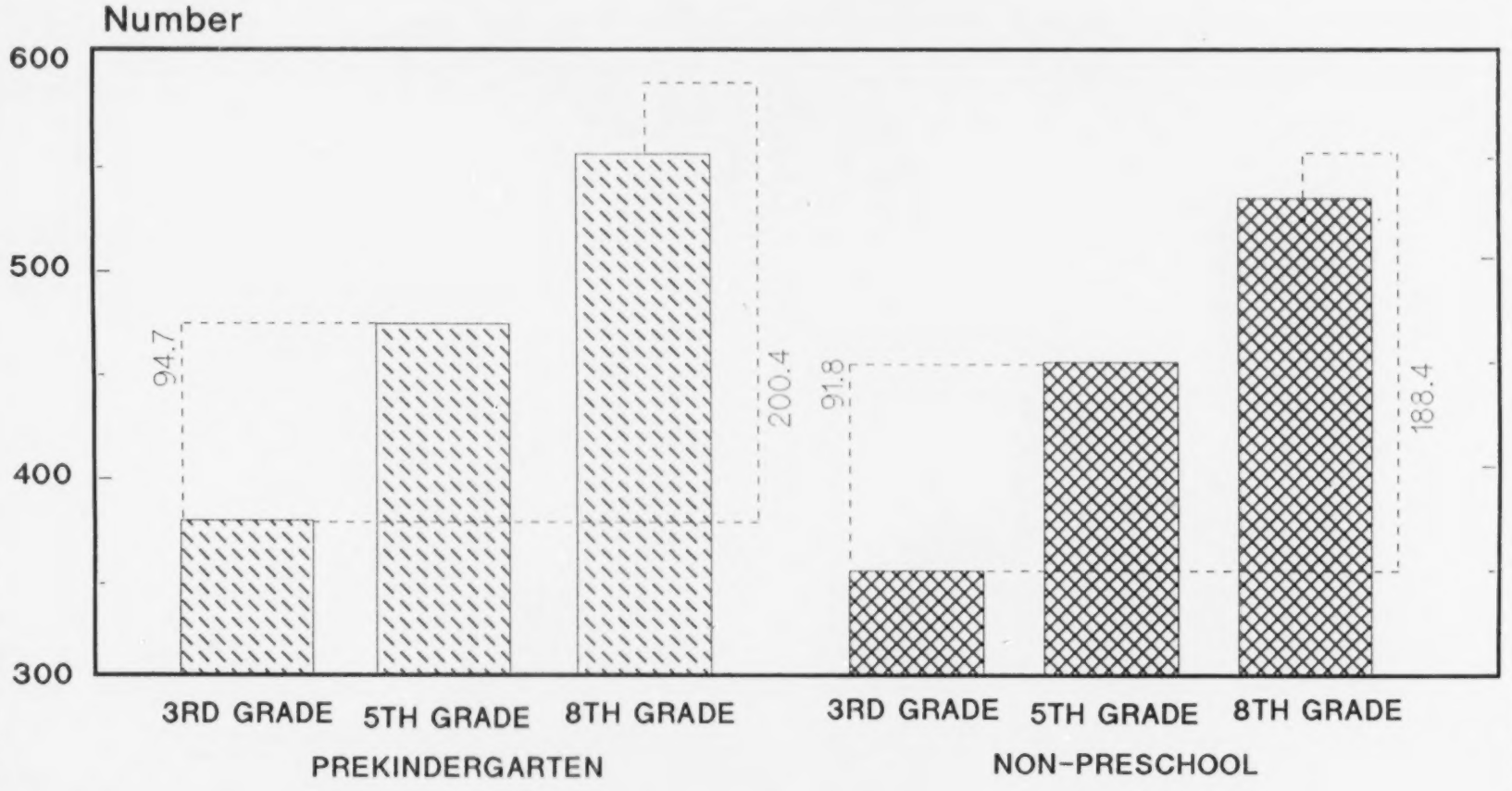
* CALIFORNIA ACHIEVEMENT TEST

MEAN LANGUAGE ARTS ACHIEVEMENT * FOR PREKINDERGARTEN AND NON-PRESCHOOL



* CALIFORNIA ACHIEVEMENT TEST

MEAN MATHEMATICS ACHIEVEMENT *
FOR PREKINDERGARTEN AND NON-PRESCHOOL



* CALIFORNIA ACHIEVEMENT TESTS

Academic Achievement: Maryland Functional Test Results

Maryland Functional Test results were used as the second measure of academic achievement. On the average, approximately 25 percent of students in the prekindergarten group and 39 percent of students in the non-preschool group did not take the test. The percentages include those students who had been retained, and were not in the ninth or tenth grade, and therefore not eligible to take the tests.

Table 7 shows that students in the prekindergarten group had a significantly higher passing rate on all three of the four functional tests. These differences between passing rates in the reading test for the two groups were not statistically significant. The pattern of higher performance on the Maryland Functional Tests favoring prekindergarten is consistent with findings on the California Achievement Tests. Differences between passing rates for the other three tests are highly significant, and in all cases the passing rate is eleven or more percentage points higher for the prekindergarten group than the non-preschool group.

Table 7

Percentage of Prekindergarten and Non-Preschool Students Passing the Maryland Functional Tests

1990-91

MARYLAND FUNCTIONAL TESTS	GROUP						Test of Significance	
	Prekindergarten			Non-Preschool				
	No. Taking	No. Passing	Passing Rate	No. Taking	No. Passing	Passing Rate	Chi-Square	p =
Reading	231	212	91.8	158	141	89.2	0.72	.3969
Mathematics	240	164	68.3	160	91	56.9	5.45	.0195
Writing	233	194	83.3	153	107	69.9	9.56	.0020
Citizenship	226	183	81.0	151	97	64.2	13.27	.0002

Question 2. Does prekindergarten participation improve economically disadvantaged children's performance to the extent that they achieve at a level comparable to that of children from a variety of socioeconomic backgrounds?

Using Achievement as the Criterion Measure

As the average student in the prekindergarten group moved through elementary and middle school, he/she kept slightly ahead of the initial national norm sample for the California Achievement Test package, and kept pace with the average for the state population. For all three tests, the state's average is only slightly above that of the prekindergarten group. However, the situation is quite different for the non-preschool group. They scored significantly lower in all three tests for grades 3, 5, and 8. In Table 8, each group's scores is presented as the average grade equivalent score for that group.

Table 8

Average Grade Equivalent Scores for the Prekindergarten and Non-Preschool Groups in Comparison to the National Norm Sample And Statewide Average

Group	Grade 3			Grade 5			Grade 8		
	Reading Comp	Total Lang	Total Math	Reading Comp	Total Lang	Total Math	Reading Comp	Total Lang	Total Math
Statewide Average	3.5	3.7	3.4	6.1	7.1	5.9	10.0	10.3	9.9
Prekinder-garten	3.1	3.3	3.3	5.8	6.6	5.7	9.2	9.6	9.1
Non-Preschool	2.5	2.7	2.9	5.5	5.5	5.3	8.1	8.4	8.3
National Norm Sample	3.3	3.4	3.1	5.5	5.6	5.3	8.4	8.3	8.5

Using Minimum Competency as the Criterion Measure

In the 1990-91 study, the prekindergarten group exceeded the state passing rate on the Maryland Functional Tests in citizenship. In writing, the prekindergarten group had the same passing rate as other Maryland students. In reading and mathematics, the prekindergarten group averaged fewer passing. Unlike, the non-preschool group who were below the state passing rates in every area. The greatest difference can be seen in mathematics, where the non-preschool group had a passing rate of 56.9% and was 16.2 percentage points behind the state passing rate. These findings show that disadvantaged students with prekindergarten backgrounds were doing as well as other Maryland students in meeting minimum academic competencies.

Table 9

Passing Rates for Prekindergarten and Non-Preschool Students on the Maryland Functional Tests in Comparison to Statewide Results

1990-91

Maryland Functional Tests	PASSING RATES					
	Prekindergarten		State		Non-Preschool	
	Total N	%	Total N	%	Total N	%
Reading	231	91.8	45,021	94.8	158	89.2
Mathematics	240	68.3	45,916	73.1	160	56.9
Writing	233	83.3	43,292	83.2	153	69.9
Citizenship	226	81.0	45,003	76.2	131	64.2

Based on these results, it is observed that in most cases prekindergarten students were able to close the performance gap with the average state student and overcome initial disadvantages. Consequently, they performed significantly better than their non-preschool cohorts.

Question 3. If prekindergarten leads to higher achievement, are the differential effects sustained over time? Does the achievement gap between the prekindergarten and non-preschool groups widen as they progress through school?

The magnitude of achievement gains over time was examined controlling for group differences in third grade achievement using scores on the reading comprehension, total language, and total mathematics subtests of the California Achievement Test. As Table 10 reveals, at fifth grade there were no significant differences in achievement between the prekindergarten and non-preschool groups in any subtest area. At eighth grade, (Table 11), a significant difference was noted on the mathematics subtests only.

California Achievement Test: Adjusted Mean Scale Scores for the Prekindergarten and Non-Preschool Groups

Table 10: Third Grade Adjusted Mean Scales Scores

Group	Grade 5		
	Reading Comprehension	Total Language	Total Mathematics
Prekindergarten	483.38	515.41	460.60
Non-Preschool	476.89	510.74	455.24

F=2.02 p>0.05 F=1.01 p>0.05 F=2.33 p>0.05

Table 11: Eighth Grade Adjusted Mean Scale Scores

Group	Grade 8		
	Reading Comprehension	Total Language	Total Mathematics
Prekindergarten	563.97	573.36	565.12
Non-Preschool	556.12	567.40	551.52

F= 1.22 p>0.05 F=1.03 p>0.05 F=5.9 p<0.05

The findings disclose that in the areas of language arts, and reading comprehension any achievement benefits that prekindergarten bestowed were acquired prior to third grade. Beyond third grade, differences persisted but the achievement gap between prekindergarten and non-preschool students did not widen. In mathematics, higher achievement at third grade ultimately led to greater achievement by grade 8. Differences between the prekindergarten and non-preschool groups widened over time only in the area of mathematics. As seen in Table 9, this trend continued into high school. By the 1990-91 school year, although the non-preschool group was close in terms of reading scores, the differential gap in mathematics continued to widen.

DISCUSSION AND CONCLUSIONS

The EEEP prekindergarten longitudinal study is being conducted to examine the effects of early education on low-income children's later school performance. In this phase of the study, the effects of prekindergarten were traced from kindergarten through tenth grade.

As indicated in previous findings, by kindergarten former prekindergarten (EEEP) students were 50 percent less likely than their non-preschool peers to be identified as at-risk for learning problems. Through the early learning years, the prekindergarten group had fewer retentions, and special education placements. Through the middle learning years, the prekindergarten group scored significantly better on reading, language arts, and mathematics portions of the California Achievement Test in grades 3, 5, and 8. Differences between the prekindergarten and non-preschool groups widened over time only in the area of mathematics. Throughout their eight years of schooling, the prekindergarten group remained constantly close, but slightly below the average achievement level of the entire student population of the state (Eckroade, et al., 1991).

During the secondary years of schooling, fewer of the prekindergarten students than the non-preschool students had been retained in grade. The prekindergarten had significantly fewer days absent, than the non-preschool group; never-the-less neither groups' participation averaged as few absences as the state. Although the drop-out rate for the prekindergarten group was lower than for the non-preschool group, the difference was not significant. However, as these students continue their schooling, the difference may become significant. Significantly more prekindergarten students passed the mathematics, writing, and citizenship portions of the Maryland Functional Tests. In terms of reading, almost as many of the non-preschool group had passed this portion of the test as in the prekindergarten group. However, the differential gap between the two groups in mathematics continued to widen.

One of the reasons that may account for the effectiveness of the EEEP prekindergarten program is that it incorporated many of the elements of model programs that operated in the early and mid 1960s. Teachers were early childhood certified and received on-going training. Staff-student ratios were high, the programs were closely supervised by teacher coordinators, and prekindergarten was closely linked to kindergarten, thereby smoothing the transition from one level of early childhood education to the next. In addition to being carefully controlled, the program in each school system had clearly defined goals and objectives and a carefully implemented curriculum. The curriculum specified a broad array of knowledge and skills that were fostered through a balance of deliberate teaching experiences and child-initiated activities.

Findings from this study, indicating that public school prekindergarten can significantly benefit its, participants should be viewed with cautious optimism. The study had some methodological limitations, such as the lack of data on children's entering abilities. As the Consortium Longitudinal Studies pointed out in "Lasting Effects After Preschool", the loss of subjects over time is one of the hazards of longitudinal research. It is important to know not only the rate of attrition but, also, whether the lost subjects were different in some way from those available for follow-up study.

The highest rate of attrition for the prekindergarten group occurred immediately following prekindergarten, and for both groups, during the early childhood years. By fourth grade, over one-third of the children in each group had left the school systems where they had started school. Prekindergarten graduates and their non-preschool peers enrolled in non-public schools and moved out-of-district at about the same rate. It is not possible to suggest what the results would have been, had all the students remained in the study.

Self-selection may also constrain the validity of the findings. It is often assumed that parents who voluntarily enroll their children in school earlier than required are more interested in their education. As the argument goes, with greater home support, the prekindergarten group may have done better anyway. By the end of the decade of the 1970s, the demand for day care already exceeded its availability. Parents thus enrolled their

children in preschool for a variety of different reasons, including both education and child care. If children were enrolled in EEEP prekindergartens for a combination of reasons, then self-selection may not be a threat to the validity of the results.

This retrospective study of the EEEP prekindergarten program effects corroborates findings from other studies with more stringent research designs. It confirms that prekindergarten schooling experience helps children perform better in the early learning years. The successful educational experience of these students appears to have a sustained long-term effect that continues through the secondary years. In summary, prekindergarten experience should be provided as part of a well-coordinated, comprehensive program that is fully integrated in the continuum of student's schooling experience from prekindergarten through grade 12. The evidence suggests that public school prekindergarten has the potential to contribute to the realization of the national goals for education and Maryland's goals for Schools for Success.

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